MECHANICS' MAGAZINE,

AND

REGISTER OF INVENTIONS AND IMPROVEMENTS.

VOLUME IV.] FOR THE WEEK ENDING SEPTEMBER 13, 1834. [NUMBER 3.

STATE PRISON LABOR.

In "AMERICA," the asylum of the oppressed of all countries, the nation that has dared to declare itself "free and independent" of the whole world, where equal rights are advocated, and those who gain an honest livelihood by their industry are as much respected as the man of the greatest wealth, it is a most extraordinary fact, that the system of our criminal jurisprudence has been for many years, and *still is*, calculated, to make many an honest and well-meaning mechanic feel shame and disgust in consequence of the society with which he has been unconsciously brought into competition and association—associated with felons! with men who have committed some of the greatest outrages on society, and who have been nominally *punished*, but who, in fact, derive more advantage to *themselves* from that nominal punishment, than they ever gained before in the same space of time. They are taught trades of various descriptions, they are well fed,—and many cases are known where the criminal has entered the prison in a weak and debilitated state, and left it, in consequence of the excellent medical aid there afforded, in good health, and apparently possessing a robust constitution, only to mingle with our mechanics; and many instances could be stated where they have been placed in a situation to be the guide and overseer of the apprentices, and even of the children of mechanics.

It is high time that such a state of things should cease to exist, and a system adopted which shall protect honest industry from a competition with the labor of felons, whether carried on for the benefit of the State, or individual contractors; and we feel confident that it is only necessary for the mechanics, in every section of the Union, to second the exertions of the Utica Convention, and it will be done, and that speedily. We have official documents that will make it clear that the present system of *punishment* has not that salutary effect upon those who have been convicted which many have supposed; and can state several instances where men have been inmates of the same or other prisons, three, four, and five times; this we shall do in this, our present number of the Mechanics' Magazine, a work which, although only known comparatively to a few, has been patronized far beyond any work of a similar nature ever issued from the press in this country, and which will ever be found advocating the interests of the *working men*, and its columns always open for their communications on any subject (*except politics*). We shall be gratified to be made the medium of communication between mechanics in different parts of the Union, and pledge them that we are devoted to their best interests; and shall do all that men with our limited means can do, to disseminate such information as will elevate the character, and improve the condition, of the mechanics of the United States; and to one measure especially do we stand pledged—never to abandon the cause *until we see the present odious State Prison Monopoly* done away, and the mechanics admitted to a full participation, in proportion to their numbers and intelligence, of the duties, stations, honors, and emoluments, of the country.

It has been well remarked by the eloquent and learned BURKE, that "no government ought to own that it exists for the purpose of checking the prosperity of its people, or that *there is such a principle involved in its policy*." That such a principle does exist in this and other States, by allowing convicts to be employed in the various branches of mechanic arts, will, we think, be readily admitted—a system calculated in every way to deteriorate and oppress the most numerous and useful of our citizens, the artizans—to injure the industrious tradesman—to promote and encourage immorality—and to throw the great mass of our trade into the hands of large capitalists, who have the means of employing an unlimited number of hands, and are thus enabled to undersell the fair industrious man who is toiling only for a living.

"We the people" profess to govern ourselves, by deputing those to be our representatives who we believe will act in accordance with our wishes on subjects of vital importance to the community, and therefore it

has been chiefly owing to our supineness on this question, that this odious system has not long since been abolished. The recent proceedings at the Utica Convention, inserted in this number, at page 133, will show that the great mass of the working-men, and the friends of working-men, are aroused on the subject. They have suffered by its continuance, in a pecuniary view, which, together with the disgraceful associations into which they have unknowingly been introduced, by working with discharged criminals, has determined them to use all lawful means to put an end to a practice which is a disgrace to our country. If the practice of teaching the convicts some means of obtaining useful employment had the desired effect of reforming them, there might be some excuse for the continuance of such a practice; but we know the contrary is the case. In a conversation, a few days since, with the Hon. Richard Riker, the Recorder of New-York, before whom many of these men have been tried, he stated that not more than two out of every hundred that had been tried before him, and imprisoned, had returned to honest pursuits; and on referring to Mr. Humphrey's report, made to the Legislature in March, 1834, we find he has stated to the Committee that fact. We cannot do better than insert his letter—it is as follows:

"New-York, 27th March, 1834.

"Gentlemen—It is not in my power to reply to your several questions at as early a period as you could have wished. A press of official duties prevents it. I answer a part of them.

"To your first question, to wit: 'What portion of offenders sentenced to the penitentiary or to the state prison, as far as your experience enables you to say, reform?'

"Answer.—I regret to say, very few. My opinion is, as far as my experience enables me to give an opinion, that there are not more than *two* out of *an hundred* of well attested instances of durable reform.

"To your second question, to wit: 'What portion of offenders sentenced to the penitentiary or to the state prison, are again tried for a second offence?'

"Answer.—This question cannot, without much examination, be answered with accuracy. I can at present only say, that at every court of the general and special sessions held in our city, with few exceptions, several old offenders, who have been before sent to our penitentiary or state prison, or to the state prison of some other State, are again tried and convicted.

"To your third question, to wit: 'Can the present penitentiary and state prison system be improved?'

"Answer.—It can. On this subject there is no doubt; the manner and details may be given so as to convince every judicious man.

"To your further question, to wit: 'Can the penitentiary and state prison system be so improved as to protect the virtuous and industrious mechanic and artizan against its influence and monopoly; and, above all, against bringing felons in competition with good, dutiful, and upright citizens?'

"Answer. This question is perhaps one which ought to be addressed to the Legislature rather than to judges. My opinion is, that means can be adopted to mitigate the evil, and that means ought to be adopted to *remove* the evil altogether. The virtuous citizen should not, in any event, be reduced to the necessity of competing with a criminal. The law must be unjust that leads to such results.

"These, and the other subjects of inquiry, I will, gentlemen, if you require it, answer at a future time, fully and in detail.

"I have the honor to be, gentlemen, your obedient servant, R. Riker.

"To Mr. Austin Baldwin, and the other Gentlemen of the Committee relative to the State Prison Monopoly."

The above letter, coming from a source better able to judge of the effect produced by attempting to reform criminals by state prison labor than any one else in the community, should have its due weight; and we do not doubt that it will.

We will now produce a few documents to show the great benefit derived by the great capitalists in contracting for prison labor, to the detriment of the working-man. We will begin with—

COOPERS.

Contract for Coopering, by Abel Wetherby, of Auburn—for 3 years, from 1832—to employ 50 convicts, viz.:

AT STATE PRISON.

2 at 50 cents per day	$1 00
9 at 30 " "	2 70
50 at 28 " "	14 00
3 at 12½ " "	37½
64	$18 07½

AT REGULAR SHOPS.

Average at regular shops, 64 hands at $1 25 per day	$80 00
	18 07½
Balance in favor of contractor	$61 92½ per day.

Of the 64 hands, 9 only were coopers when sent there: of course, 55 are there learning the trade. From the above statement we see that the contract was made for 50, and that the contractor obtained the pri-

vilege of 14 more than were contracted for. Now, then, let us see the advantage accruing to the contractor by this privilege alone, granted, no doubt, by favor:

14 journeymen, at $1 25 per day	$17 50
14 convicts, at 28 cents per day	3 92
Profit on 14 hands, per day, who were not contracted for	$14 58

From the above statement, taken from official documents, it will be perceived that the profit of Mr. Wetherby, over the regular employing cooper, is $61 92½ per day. What kind of competition is this? It must be borne in mind that this is the loss of journeymen coopers. The master coopers' income, to cover shop rent, family support, and other incidental expenses, are not included; besides, interest for three months, being the credit for labor in the state prison, is also to be added.

Mr. Chichester, of Troy, has also a contract for 150 convicts at the coopering business; thus, 256 hands are employed in one branch of business, robbing the journeymen coopers of $248 32 per day, or $74,-496 per year. All other trades are robbed of their rights in the same proportion. We will give the number of each trade, and beg our readers to consider the statement respecting Mr. Wetherby as a fair criterion.

At the Auburn prison the employment of convicts on the 1st of September, 1833, was as follows:

TO WORK ON CONTRACT.		
Bedtick weavers and spoolers	86	
Shoemakers	44	
Coopers	61	
Hame makers	50	
Tailors	38	
Cabinet makers	49	
Tool makers	40	
Machinists	45	
Comb makers	38	
Clock makers	22	
Coverlet weavers	25	
		498
TO WORK FOR STATE.		
Stone cutters		18
Weavers and spoolers	6	
Blacksmiths	6	
Carpenters	7	
Tailors and barbers	10	
Shoemakers	5	
Wood sawyers and laborers	18	
Soap boilers and hostler	3	
Attendants in Wings	10	
Cooks and washers	28	
Coopers	2	
Hospital nurses	2	
do. sick	6	
Invalids not employed	4	
Masons	8	
Laborers and tenders	20	
Stocking weavers	3	
Females	24	
		163
Total		679

Convicts confined in this prison were employed on the 30th Sept., 1833, on work as follows:

AT WORK FOR SALE.		
Locksmith shop	40	
Blacksmith shop	37	
Coopers' shop	162	
Shoemakers' shop	90	
Weavers and tailors' shop	18	
Hatters' shop	11	
Stone shops	174	
Laborers in coopers' yard	22	
Do. front yard	15	
North and south quarries	76	
		645
UNEMPLOYED OR AT WORK FOR STATE.		
Blacksmith shop	19*	
Shoemakers' shop	9	
Weavers and tailors' shop	38	
Cooks, bakers, and washers, in kitchen	18	
Masons, stone cutters, and laborers at prison buildings	45	
Waiters, &c. in prison hall	15	
Sick and lame in hospital	20	
Waiters in hospital	2	
		166
Total		811

So that on Sept. 1–30, 1833, there were 1490 convicts being initiated into some method of mixing with our honest hard-working mechanics, notwithstanding we have the authority of the Recorder of the greatest city in the Union for stating, that not more than two out of each hundred ever come out without returning to their vicious propensities sooner or later! It appears, on reference to Mr. Humphrey's report, that there were discharged from Sing-Sing during the six months previous to September, 1833, ninety-nine.

Of this number, worked at some mechanical branch in prison	51
Twenty-nine had worked at mechanical business before they came to prison. Two of the discharged mechanics have returned to prison; and one pardoned on condition of going to sea.	32
Leaving the actual number added to the whole number of mechanics	19

And at Auburn, during the same period, one hundred and eight, namely:

Coopers	7
Tool makers	4
Shoemakers	10
Weavers	15
Tailors	4
Clock makers	2
Machinists	1
Smiths	3
Comb makers	4
Hame and saddle-tree makers	2
Cabinet and chair makers	7
Stone cutters	5
Spoolers	3
Tinman and brass founder	2
Carpenters	1
Laborers	13
Invalids	7
Females	6
Waiters, washers, and cooks	10
Barber and gardener	2
	108

* At work in other shops.

Among those who have been re-committed we select the following—hundreds of others might be added.

"Charles W. Zeiss—First time sentenced to city prison, 1826; second time, August, 1831, state prison; third time, January, 1834, acquitted and arraigned for false pretences.

"James Gallagher—Three times penitentiary; three times state prison.

"Peter Bowerhorn—Four times penitentiary; twice in state prison in New-York, besides having been in southern prisons; is 32 years of age, and been 17 years in prison.

"Patrick M'Gill—Three times in the state prison for grand larceny.

"William Tryon—Once state prison; twice penitentiary.

"William Simmons—Once state prison; twice penitentiary.

"Etyler Jacox—Three times state prison.

"Brickbat, alias Owen—Once penitentiary; once state prison.

"Henry Griffin—Three times state prison, twice for forgery.

"Josiah Hagar—Three times state prison; died there—an aggravated case."

Is such a state of things to be borne? Is it not time that a most decided stand should be made against this worst of all monopolies? Are we to remain passive spectators, while our children, our brothers, and our sisters, are liable to be made the dupes and assistants in crime, of such a set of *scoundrels?* No, no! We are persuaded that the mechanics, and the friends of mechanics, in America, will now rouse themselves; they will feel it a duty upon them to give the most determined opposition to such a system—to petition, to remonstrate; and never to cease their exertions until they obtain the abolition of a custom so obnoxious and so fraught with evil to the best interests of the community.

Mechanics—The Actions and Postures of Animals, and particularly of Man, illustrate beautifully the observations with respect to the centre of gravity.

A body, we have seen, is tottering in proportion as it has great altitude and narrow base—but it is the noble prerogative of man to be able to support his towering figure with great firmness, on a very narrow base, and under constant change of attitude. This faculty is acquired slowly because of the difficulty. A child does well who walks at the end of ten or twelve months; while the young of quadrupeds, which have a broad supporting base, are able to stand and even to move about almost immediately.

The supporting base of a man is the space occupied by and included between the feet. The advantage of turning out the toes is, that without taking much from the length of the base, it adds considerably to the breadth.

If there be much art in walking on two perfect feet, there is still more in walking on two slender legs, with rounded extremities; which, however, we often see done, by mutilated soldiers and sailors.

All the ladies of the empire of China have to acquire nearly the same talent as these victims of war; for barbarous custom has crippled them, by confining their feet for life in the shoes which fitted them in infancy.

But surpassing in difficulty any of these instances is the practice, which is general among the inhabitants of the sandy plains called the *Landes,* in the south-west of France, of walking on stilts. The *Landes* afford tolerable pasture for sheep; but during one portion of the year they are half covered with water, and during the remainder they are still very unfit walking-ground, by reason of their deep loose sand and thick furze. The natives meet the inconveniences of all seasons by doubling the length of their natural legs, through the addition to them of the stilts mentioned, which they call *des echasses.* Mounted on these, which are wooden poles, put on and off as regularly as the other parts of dress, they appear to strangers a new and extraordinary race of long-legged beings, marching readily over the loose sand, or through the water, with steps of eight or ten feet in length, and with speed equalling that of a trotting horse: their moderate journeys being of thirty or forty miles in a day. While watching their flocks, they fix themselves in convenient stations, by means of a long staff supporting them behind, and with their rough sheep-skin cloaks and caps, which cover them above, like thatched roofs, they appear like little watch-towers, or singular lofty tripods, scattered over the face of the country.

Still beyond the art of walking on stilts is that which some persons attain of walking and dancing on a single rope or wire; or even of keeping the centre of gravity above the base, while standing on the moveable support of a galloping horse. A rope-dancer usually carries a long pole in his hand, to balance him: it is loaded at each end, and when he inclines, he throws it a little towards the side required, that the reaction may restore his body to perpendicularity.

Much art of the same sort is shown in the attitudes and evolutions of the skater; in the amusements of supporting a stick upright

on the end of the finger ; and in many other feats of a like kind.

Attitudes generally depend on the necessity of keeping the centre of gravity of the body over the base under variety of circumstances, as in—the straight or upright port of a man who carries a load on his head—the leaning forward of one who carries it on his back—the hanging backwards of one who bears it between his arms—the leaning to one side of him who is carrying a weight on the other side—the habitual carriage of very fat people, whose head and shoulders are thrown back, giving a certain air of self-satisfaction,—an air which belongs also to the state of pregnancy, and even to that of the dropsical patient, although producing in it so sad an incongruity.

When a man walks or runs, he inclines forward, that the centre of gravity may overhang the base; and he must then be constantly advancing his feet to prevent his falling. He makes his body incline just enough to produce the velocity which he desires.

A man, in pulling horizontally at a load, is merely causing his body to overhang its base, so that its tendency to fall may become a force or power applicable to the work.

When a man rises from a chair, he is seen first bending the body forward, so as to bring the centre of gravity over the feet or base, and then he lifts the body up. If he lift too soon, that is, before the body be sufficiently advanced, he falls back again.

A man standing with his heels close to a perpendicular wall, cannot, without himself falling forward, bend sufficiently to pick up any object that lies before him on the ground; because the wall prevents him from throwing part of his body backward, to counterbalance the head and arms, that must project forward. A man, little versed in such matters, agreed to give ten guineas for permission to try to possess himself of a purse of twenty, thus laid before him: he of course lost his money.

When a man walks at a moderate rate, his centre of gravity comes alternately over the right and over the left foot. This is the reason why the body advances in a waving line, and why persons walking arm in arm shake each other, unless they make the movements of their feet to correspond, as soldiers do in marching.

Sea sickness is a subject closely related to the present. Man requiring, as now explained, so strictly to maintain his perpendicularity, that is, to keep the centre of gravity always over the supporting part of his body, ascertains the required position in various ways, but chiefly by the observed perpendicularity, or other known position of things about him. Vertigo and sickness are the consequences of depriving him of his standards of comparison or of disturbing them.

Hence, on shipboard, where the lines of the masts, windows, furniture, &c. are constantly changing, sickness, vertigo, and other affections of the same class, are common to persons unaccustomed to ships. Many persons experience similar effects in carriages, and in swings; or on looking from a lofty precipice, where known objects being distant, and viewed under a new aspect, are not so readily recognized; also in walking on a wall or roof; in looking directly up to a roof, or to the stars in the zenith, because then all standards disappear; on entering a round room, where there are no perpendicular lines of light and shade, as when the walls and roof are covered with a paper which has no regular arrangement of spot; on turning round as in waltzing, or if placed on a wheel; because the eye is not then allowed to rest long enough on any standard, &c.

People when in the dark, and therefore blind people always, use standards belonging to the sense of touch ; and it is because, on board of ships, the standards both of sight and of touch are lost, that the effect on persons is so very remarkable.

But sea sickness also partly depends on the irregular pressure of the bowels among themselves and against the containing parts, when the influence of their inertia and weight varies with the rising and falling of the ship.

From the nature of sea sickness, as discovered in these facts, it is seen why persons unaccustomed to the motion of a ship often find relief by keeping their eyes directed to the fixed shore, where it is visible ; or by lying down on their backs and shutting their eyes; or by taking such a dose of exhilarating drink as shall diminish their sensibility to all objects of external sense.

As no condition or form of matter escapes from the great laws of nature, we find the attitudes and general condition of vegetable, as well as of animal bodies, characterized by the necessity of having the centre of gravity supported over the base. Thus, with what admiration do we contemplate the pine and other trees in the forests of nature, springing up to heaven as perpendicularly as if the plummet had been at work to direct them ; and on the brows of precipitous hills no less than in the level plains! On a smaller scale, we see the grasses and corn-stalks of our cultivated fields illustrating the same truth. And whenever, in tree or shrub, accident or peculiar nature causes a deviation from the

laws of perpendicularity, additional strength and support are provided.—[Dr. Arnott.]

Animal Mechanics, or Proofs of Design in the Animal Frame. Part II., showing the Application of the Living Forces. [From the Library of Useful Knowledge.]

(Continued from page 116.)

CHAPTER II.

ON THE ILLUSTRATIONS FROM MECHANICS.—The illustrations from Mechanics may be carried too far. Peculiar properties of life in the body. They differ in quality. They have an adjustment to each other more admirable than the mechanical connection.

We are the more desirous of entering upon this subject, that we may prevent the reader from founding a false conclusion upon the very mode in which we have hitherto proceeded, that of showing design in every part of the animal structure by taking our illustrations from the mechanism of the body.

When we have admired the connections of the several parts, or organs, thus made manifest by comparison with machinery, we may go too far, and say that the material structure and mechanical relation are to be found in still greater minuteness and perfection in the finer textures of the body—proceed to call this organization, and erroneously conclude that, out of organization, comes life. The very term organization misleads, yet it implies something constructed in which one part co-operates with another, but nothing more. Taking the body as a whole, there are undoubtedly instances of such co-operation, but it is in vain to seek the explanation of life from this, since life exists in simple and uniform substances, where there is neither construction nor relation.

Now, although there are mechanical construction and relation, as we have seen in bones, muscles, and tendons, the phenomena of the body result from a dependence established among the living properties, not the mechanical. The highest medical authorities have seen reason to conclude, that life is an endowment not resulting from organization or construction, but, on the contrary, producing it; in other words, that the living principle attracts the new matter, arranges it, and, in order to its continuance and perfection, alters it, and effects a continual revolution in it. For there is nothing more curious than the uninterrupted and rapid change of the material of the animal body, from the first pulse of life to the last breath that is drawn, of which we shall give abundant proofs before we close this inquiry.

In first approaching the subject we are blinded by familiar occurrences, and cannot comprehend all the links by which the visible phenomena of the living body are produced. Probably most of our readers believe motion to be a necessary consequence of life, and the very proof of its presence. The peasant stirs up an animal with his staff, and if it does not move he is satisfied that it is dead; and such is the experience of mankind. We do not reflect that many different qualities of the living powers must be exercised before sensibility is shown in its visible sign, the motion of the creature. It is not necessary that the parts shall lock into each other like the cogs of wheels; the connections established are of a different kind altogether. Each part possesses a property of life entirely distinct from the other, and this property of life may exist in the individual part (for a time at least) without that co-operation of the whole which is necessary for the motions of the animal.

This quality of life is, in one respect, like gravitation in matter; that is, when the mass is broken into parts, each division has its proportion of the endowment, and so the separated parts of a living creature possess life. But here the resemblance ceases: gravitation is the same quality in every part, and uniform in its effects, whilst the life is exhibited by qualities differing in every part of the animal body. Did these parts possess qualities exactly similar, they would remain at rest, and, though combined, they would not influence each other. It is the different powers brought into combination that produce the motion of the whole animal.

If a man fall into the water, and is dragged out motionless, and has ceased to breathe, each part of his body may still possess its property of life. Although the combinations have been destroyed, he may be revived by exciting action in some part of his system. Life still remains in his brain, and nerves, and heart, and arteries, and in the muscles, which should enable him to breathe; but the mutual influence, the bond of their united operations, is broken. We may take the analogy of a machine, and say that the wheels are stopped; but this is, in fact, a very different thing; it is the operation of the living influence that is stopped, for we repeat that nature, (by which, of course, is always to be understood the Author of Nature,) has combined the organs not mechanically, but by properties of life.

Artificial respiration draws after it the action of the heart, because the sensibility of the heart is made respondent to the lungs. Pulsation of the heart, excited by the mo-

tion of the lungs, is followed by the action of the arteries; these organs, in operation, drive the blood through the frame, and, by the circulation, the susceptibility of each part to impression, which had been weakened, is restored. Action and re-action are re-established; but these actions are not like those of a machine, they are living properties; sensibility in one part, contractility in another; and after a variety of these internal sensibilities have been for some time in operation, the man gives outward token of recovery.

So a person recovering from fainting, after sobbing and irregular breathing, has the respiration renewed; in succession other parts recover their sensibility, and resume their places in the circle of relations; the skin is capable of being stimulated, and the limbs are capable of motion; the eyelids are opened; by and by the nerve of the eye is sensible to light, and the nerve of the ear to sound; and finally, the faculties of the mind are roused, and its control over the body re-established. The whole separate endowments of life in the different parts resume their offices; the last in the train; only the property of the muscle to contract is alone observed by the uninformed, and voluntary motion is the token of entire restoration.

We can imagine a half-learned person to act very foolishly in the attempt to restore the apparently drowned. He has been told that we draw in vital air, and breathe out what is unfit to support life; he imagines that it can be of no use to distend the lungs of the drowning person with his own breath, and precious time is lost. Whereas, the mere distension of the chest, that is, of the lungs, followed by the compression of the chest, and again by the distension, and so on alternately, is the *play of the lungs*, which by sympathy draws the heart into action, and in succession all the vital organs. This is not what chemistry teaches: chemistry shows us that the vital air influences the blood; and it is true that the blood, being refreshed or impregnated with the vital air, renews the properties of life. But this effect on the blood could never take place unless there were some previous consent or sympathy, putting the organs into operation. We repeat, that the consent of organs is not the effect of mechanical adaptation, or of chemical action, but of relation established among the vital properties.

If a man be struck by lightning, he has not merely the vital operation of respiration stopped, as in the case of the drowning man, in whom every organ continues to possess its property of life; he is not like a man struck on the head, where one vital organ is so disturbed that the circle of vital actions is broken; in this instance the electric fire passes through every fibre and every organ—all the qualities of life, whether residing in the brain, nerve, or muscle, are instantaneously destroyed, and the moment of death is the commencement of dissolution.

Mr. John Hunter illustrated this somewhat familiarly. If you bruise the head of an eel, its body writhes; but if it be taken by the tail, and struck on the flag-stone, so that every part of its body receives the shock, then all the parts are killed, and it remains motionless. When an animal is killed by that violence which injures one important organ, the property of life remains for a certain time in every part; those parts have no correspondence, and there is no outward token of life; but the vital principle is still capable of exhibiting one of its most important properties—it arrests the operation of those chemical affinities which belong to dead matter.

Thus the reader perceives, that, although he be led on to comprehend the design or intention manifested in the structure of the body by mechanical instances or comparisons, it is when we contemplate the influence of the living principle, that we have a higher conviction of the Omnipotence, which has formed every creature, and every part of each creature, with that appropriate endowment of life which suits it to act its part in the general system.

We must learn to distinguish between the death of the animal, and the death of the parts of the animal—between apparent death and dissolution, or the separation of that quality which distinguishes living matter.

Viewing the subject generally, as Mr. Hunter said, there are not two kinds of matter, but two conditions of matter. It is at one moment forming beautiful combinations, as in the flower, through the principle of life, and, at another, it is cast away as noxious, undergoing changes by decomposition, from chemical processes solely. The want of combination in the whole animal body exhibits apparent death. The loss of life in all the parts of an animal body is absolutely death, and the material becomes subjected to the influence of the chemical affinities, instead of being urged into motion by life.

The jackstone produces motion in one part of a machine; that, varied by mechanical influence, is communicated to a second; from the teeth of one wheel it is communicated to the corresponding leaves of the pinions, and from the pinions to the fusees. But what a base notion it is to suppose that

the mere property of weight in the jackstone is like the influence of life!

The weight is the power, in the language of mechanicians; but it does not reside in the parts of a machine, nor does it exhibit different qualifications in these parts. Separate them, and they are nothing. On the contrary, no one part of an animal body is in this matter dependent on another for its property of life. The property is inherent in the part itself, and the wonderful thing is that each property in the several organs corresponds with the others so as to form a circle of vital operations. There is no transmission of power, in all this, from part to part—no train of connection to be traced as from the jackstone, or the spring, along the parts of the machine. There is therefore, in truth, no resemblance between machinery and the influences in operation in a living body. What is to be admired in a living body is not merely the adaptation of bones, muscles, and tendons, forming a mechanical apparatus, but rather the different qualities which life bestows upon different parts; these qualities put the parts into relation, each according to its place in the circle of the economy; and among innumerable properties of life in the individual parts, produce that perfect co-operation as if one principle only actuated the whole.

When a person moves under the direction of the will, nothing can be more simple to our understanding, because we do not attempt to trace the links, far less to estimate the powers in the several parts influenced during this familiar action. But if there be the slightest diminution of sensibility of one nerve, so that it shall not transmit sensation, or if there be any disturbance which retards in the least degree the transmission of the will along another appropriate nerve—if the muscle be benumbed, or have lost its irritability—if the action of the blood vessels has been either diminished or increased beyond their ordinary course, either in the organs of sense, the brain, or nerves,—we are appalled by the consequences. The impressions of things are not felt; the senses are unexercised; the limbs remain inactive; one half, or the whole, of the body is a load, as if there were a living being in a dead body—a body whose parts refuse their office—appearing dead, though they are not so. The correspondence of their living qualities has alone been disturbed; the movement which results from the whole is stopped, and there is apparent death.

What confusion then must be engendered in the minds of those who would confound the phenomena of life, as presented in the entire frame-work of the body, with those separate qualities of life, which, residing in the several parts, must enter into combination for the motion of the whole!

The next step of this unphilosophical manner of treating the subject is to make the organization the source of the living property,—as if any combination of organs could produce life,—as if those organs could have motion without the distinct endowments of life in their separate parts,—as if they co-operated mechanically, and not from the correspondence among their living properties. Those who thus reason mean to say, that parts are made so finely as to move of themselves, one part propelling another, and the motion of the whole producing life. It is quite clear, that this confusion of ideas arises from contemplating the phenomena of the perfect animal, in which all intermediate influences are confounded. On the other hand we present this proposition.

The several *simple* substances of a living body have each an endowment of life bestowed upon them. Let us take the obvious qualities, of sensibility—the power of transmission—and the power of motion; each of which is appropriate to a particular substance. When these qualities are put in relation, impressions may produce motion, and thus there are three distinct properties of life brought into operation. Where is the organization or construction here? Without those living endowments, these parts would be inoperative, in whatever juxta-position placed. The mechanical construction of the body is one thing,—and we are able to admire it, because it can be illustrated by comparison with our own contrivances; the combination of living properties is another and an entirely different thing.

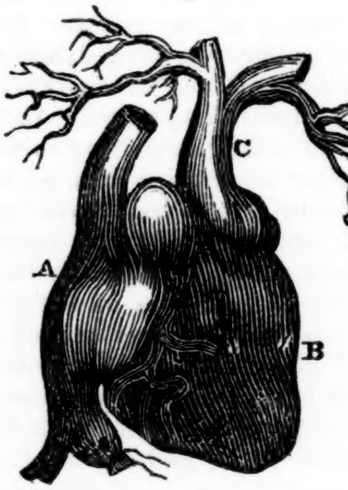
We here reach the limit of philosophical inquiry. Hitherto all has been flattering to the pride of the creature, but we must now humbly acknowledge the inscrutable ways of the Creator; and ceasing to trace the origin of life more than we do that of gravitation, we should be occupied in observing its laws, not in exploring its source.

We shall take an instance to illustrate the difference betwixt the mechanical connection of parts and their relations through the living properties; and it will, at the same time, show how curiously the living properties and the mechanical properties are made to correspond with each other.

A stream of water is converted into a mechanical power: it fills a cistern, which is attached to a lever; the cistern descends by the weight of water; by its descent a valve is pushed open; the water escapes, and the

cistern ascends, and remains so till the stream flowing into it again depresses it. Thus the regularity of the supply of water gives regularity of motion to the machine. Compare this with the heart.

Fig. 23.



We may describe the heart as consisting of two cavities, the one called the *Auricle*, and the other the *Ventricle*. The sinus A, (fig. 23,) receives the blood returning by the veins; and gradually filling, like a cistern, it becomes so distended that its muscular power is excited; it contracts, and delivers the blood with a sudden impetus into the second cavity, or the ventricle B, which, in its turn, excited by the distension, contracts, and propels the blood into the artery C. Here the action of the heart is accounted for, by its mechanical distension with the blood; and the regularity of its motions necessarily correspond with the regularity of the supply. The distension produces action, and the propulsion of the blood from the cavity allows a momentary state of rest, until another volume of the blood excites another pulse.

But we have now to observe, that when this irritability or muscular power was bestowed upon the heart, it was directed by a law entirely different from the irritability as possessed by other muscles. A property of alternate activity and rest was given to it, quite unlike the contractility of other parts; and accordingly, when the heart is empty, when there is no distension of blood at all, the two cavities will continue their alternate action. Nay, if the heart be taken from the animal recently dead, it will continue to act in regular successive pulses, first the one cavity, and then the other, and so on successively for a long time, until the life be quite exhausted. The two cavities will thus continue in alternate action, as if they were employed in the office of propelling the blood, when there is no blood contained within them. It is superfluous to observe that no such thing could happen in the case of the cistern and lever, were the stream of water to cease running.

Thus we distinguish two things quite different: a mechanical or hydraulic provision, by which these little cisterns, the auricle and ventricle, shall be regularly supplied, and alternately filled and emptied—and the property of contraction in the heart, not a mere property of contraction from irritation, as in the other muscles, but a property far more admirable, since the irritability or power of contraction of the part is ordered with a reference to its office—that it shall contract and relax in regular and rapid succession, and continue its office unweariedly through a long life. The living property of the heart exhibits a variety adapted to its office, and a correspondence still more admirable than the mechanical relation. We are thus particular in distinguishing the mechanical adaptation of parts from the co-operation of the vital influences residing in the several parts; for there are many who will take the illustration from mechanics, and stop their inquiry there, and who entertain a confused notion of the dependence of the life of the body on its mechanism.

Another mistake which some philosophical inquirers entertain, is to fancy that the principle of life is of a galvanic nature. There is, indeed, an unwillingness in men to acknowledge that their powers of reason are exhausted, and that they have arrived at an ultimate stage; they would fain set up some contrivance to hide the humiliating truth. Whatever notions have prevailed in the schools at different epochs, of heat, electricity, or galvanism, we find an attempt to explain the phenomena of life by an application of the powers with which they have been successful in their physical inquiries. Experiments without reason are equally delusive with hypotheses; those who will not give themselves the labor of thought, desire to witness striking phenomena; wonderstruck, they believe that they are engaged in experimental investigation, when their state of mind is little better than idle amazement. A calf's head is made to yawn, or a man cut down from the gallows to move, like a figure of cards pulled with strings; the jaws move, and the eyes roll, and this is done by conveying the galvanic shock to the nerves; here it is supposed that nothing less than the principle of life itself can work such wonders, and that galvanism is this principle.

Putting aside the circumstance already

stated, of life exhibiting totally different phenomena in union with different parts, is there any point of resemblance between galvanism and life? Does tying the nerve stop the influence of galvanism as it does the influence of life? Does galvanism course along a cord when it is surrounded by matter in contact with it of the same nature? can life pass out of one body into another, like heat, or electricity, or galvanism? Can *they* be contained by a thin membrane? Does life pass equally through all the parts of a moist animal body as one uniform influence, like galvanism?

In no circumstance is there a resemblance, and the whole phenomena resulting from galvanism transmitted through an animal apparently dead, are fairly to be attributed to its being a high stimulus conveyed through the moist animal body, and exciting the powers which remain insulated in the several parts; and in exciting those forces, far from renewing them, it exhausts them altogether.

The uses made of galvanism, in the explanation of the living phenomena, should make sensible men very cautious how they carry the legitimate inductions of chemical science into another department. They will not submit to call the irritability or contractility of a muscle an endowment of life, but seek to explain it by organization. They employ the microscope; they find the ultimate fibre to be some thousandth part of an inch in breadth; they see plicæ or folds; they imagine them to be cells into which the fibres are divided; they furnish these cells with two different gases, and explode them by some galvanic influence of the nerves; and the explosion, by dilating the cells in one direction, causes the contraction in another. This is the theory of muscular action at the period of the discovery of the gases; and some such idle hypothesis, supposed applicable to the laws of life, accompanies every considerable improvement in chemistry.

In the most modern and the most popular French work on Physiology, by M. Richerand, he says, "What appears to me by much the most ingenious opinion, and which carries with it the greatest probability, is that which supposes the contraction of the muscle to depend on the combination of hydrogen, carbon, and azote, and other combustible substances which exist in the fleshy fibre, with the oxygen conveyed to them through the arteries." But he adds, 'as if he had perfected the theory,' "it is also necessary to suppose, that a nervous fluid is directed through the muscle to determine the decomposition, as the electric spark forms water out of two gases."

Such is the chemical theory of muscular motion; it betrays an entire misunderstanding of the phenomena of muscular motion, and of the beautiful provision in every muscle for its appropriate office. The muscles, which are subservient to the organs of sense, differ in their operations altogether from the voluntary muscles of the limbs. The hollow muscles, as they are termed, those which carry down the food, and which carry round the blood in circulation, vary in their time and manner of acting according to their offices; but what conception can he have of such adjustment of powers, who is entertaining himself with a theory that supposes a sudden explosion to take place in the fibres of the muscle at their time of action? Inductive reasoning, which has carried men to the highest acquirements in physical science, is here laid aside; conjectures totally inconsistent with the phenomena of life are employed in its stead, and the useful philosopher becomes a very indifferent physiologist.

The Art of Wine Making—the Gervais Fermenting Apparatus Improved.

[From the London Mechanics' Magazine.]

Mr. Booth, whose treatise on the Art of Brewing we lately noticed,* has just produced another treatise on the kindred "Art of Wine-making;"† or, to speak more properly, a volume supplementary to the former. The general principles, and many of the manipulations, of the two arts are so similar, that the business of this new treatise consists mainly in pointing out those peculiarities by which the manufacture of wine differs from that of beer; and the two treatises are so intimately connected, that the one cannnot be profitably perused without constant reference to the other. As Mr. Booth himself observes, "the four parts of the Art of Brewing and these two of Wine-making, with the Appendix on Cider and Perry, may be considered as one continued work, embracing a general system for the manufacture of vinous liquors."

Mr. Booth in his present work treats first of "Wine-making in Warm Countries," and next of "Wine-making in Cold Countries;" or in other words, of foreign and home-made wines in all their numerous varieties. He gives, under both these heads, a great deal of very useful (though not often very novel) information, derived from the most authentic

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* See p. 1, vol. iv., of this Magazine.

† The Art of Wine-making in all its branches. By David Booth. To which is added an Appendix concerning Cider and Perry. London: F. J. Mason. 123 pp. 8vo.

sources, and interspersed with much shrewd observation and judicious advice. One of his best chapters relates to the much contested point, whether open or close tuns are best suited to the process of fermentation? The ancient practice of the wine provinces of France was to leave the tuns open, or, at least, to cover them very slightly; but at the beginning of the present century, a Mademoiselle Gervais introduced a close fermenting apparatus, (afterwards patented in Great Britain by Messrs. Deurbrouck and Nichols,) which having the good luck to be patronised by the celebrated Chaptal, has become all the fashion among our French neighbors. According to the partisans of this new method, it serves not only "to condense, and to return into the fermenting fluid, all the aqueous, spirituous, and balsamic vapors which are usually carried off with the carbonic acid gas, and thereby to enrich the wine, by preserving entire its spirit and perfume," but actually augments the quantity of wine obtained, by from 9 to 15 per cent. Mr. Booth does not altogether dispute these conclusions, but he insists that they are prodigiously exaggerated. He maintains that the increase of volume is "not above one in two hundred;" that "this increase is caused by the condensation of all the gas that is evolved during the whole progress of the fermentation;" and that the proportion of this condensation, which is spirituous, is probably "very small."

We shall leave Mr. Booth, however, to speak for himself. He commences very properly by describing what the Gervais apparatus is, and how it has been proposed by M. Dubrunfaut to free it of its more striking defects.

"Z Z, A A, (see fig. 1,) is the perpendicular and central section of a fermenting-tun, with the apparatus affixed to the close head Z Z.

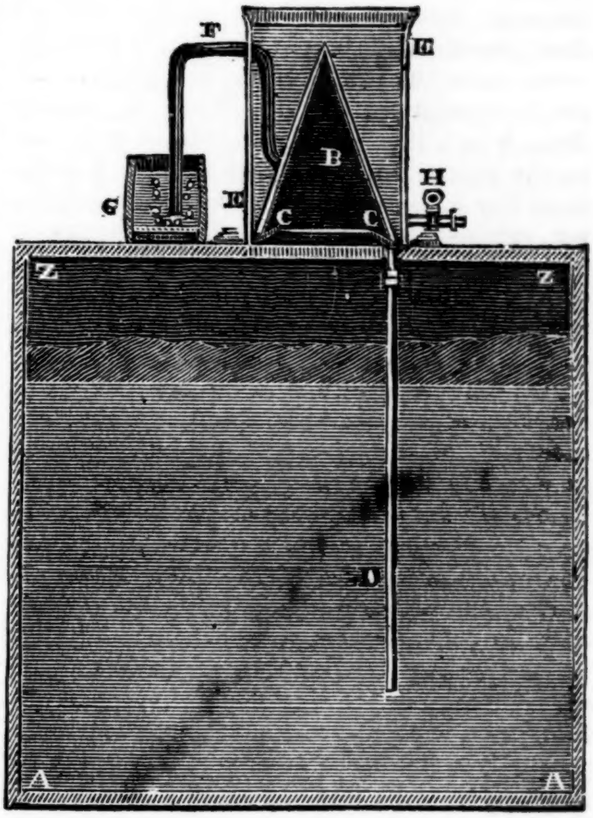
"B is a cone of tinned iron plate, communicating at bottom with the tun, by means of a hole in the cover Z Z.

"C C is a small channel extending round the interior base of the cone, being adapted to receive the condensed '*alcohol* and *essential oils*;' from whence they are conducted, down the small pipe D, into the lower part of the liquor in the vat.

"E E is a cylinder of the same material as the cone which it surrounds, and containing cold water, for the purpose of condensing the vapors which rise into the cone during the fermentation.

"F is an egress pipe, communicating with the interior of the cone, its extremity being immersed to the depth of six inches, at least,

Fig. 1.



below the surface of the water in the small tub G, from whence the incondensable gases are permitted to escape into the atmosphere.

"H is a cock to draw off the water from the reservoir E E, when it becomes warm, and requires to be replaced with cold water, as is the case in high fermentations.

"It is asserted by the French chemists, and conceded by Messrs. Deurbrouck and Nichols, the English patentees, that the vinous fermentation will not commence without the access of atmospheric air or of oxygen; but after it has once begun, the further exposure to the air is unnecessary; and the quantity contained in the empty space (left in the tun to prevent the head from rising into the cone) is, they say, perfectly sufficient to originate the fermentation: but, they add, 'as soon as carbonic acid is evolved from the fermenting gyle, the atmospheric air, being lighter, is driven out from the upper part of the working tun; and as no air is permitted to enter afterwards, all the subsequent carbonic acid gas emitted diminishes the quantity of oxygen contained in the gyle, by the oxygen uniting with the carbon as fast as it disunites from the saccharine matter during its decomposition, and thereby secures a soundness and peculiar mildness not to be produced by any other mode.'

"Never having seen the effects of fermentation in tuns, thus, as it were, hermetically sealed, we cannot personally join in their

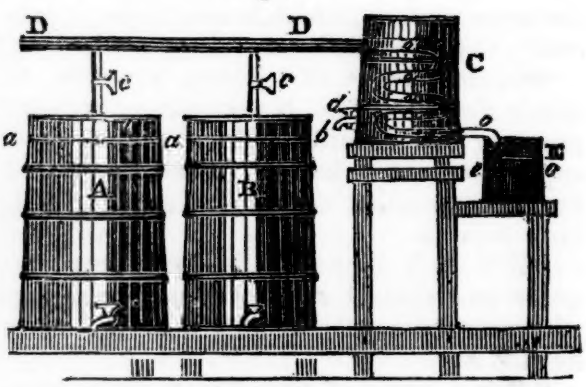
praise; but we apprehend that there is one inherent defect which will always prevent their general adoption in the British brewery —we mean the tardiness of the progress of the fermentation. From fifteen to twenty days, which it is granted would be requisite for the fermentation of table beer, is a sufficient bar to its adoption. On this principle, we suppose that the Scotch ale brewers, who, even with open tuns, often take three or four weeks to a gyle, would require the whole of their brewing season for a single operation.

"It will be observed in the preceding description of the Gervais apparatus, that the extremity of the *egress pipe* F is immersed in water *to the depth of six inches at least.* These six inches impose an additional pressure upon the surface of the fermenting fluid, equivalent, at an average, to the sixty-fourth part of the whole weight of the atmosphere; and, in consequence, has a material effect in preventing the escape of the carbonic acid, thereby retarding the attenuation. 'In fact,' says M. Dubrunfaut, 'the gas, meeting with a powerful obstacle, which opposes its passage through this condensing apparatus, forces its way by other issues, which it finds in the pores of the wood, and the fissures of the lutes which are recommended to close the joints of the cover of the tun. The portion of the gas which thus escapes, by openings that can never be kept closed under such a pressure, subtracts the alcoholic vapors from the refrigerator, and is a fundamental error in the construction of the Gervais apparatus.' We may add, that had it even been perfect, it was not new: it was nothing more than a combination of two principles which had been long known—the condenser of Jean Baptiste Porto, a Neapolitan, which was described in a work on Distillation, published by him in 1609; and the hydraulic valve of M. D. Casbois, which was announced in a French Journal of Sciences and the Arts in 1783.

"It will naturally be asked, in this place, whether or not the rise in the barometer, to the extent of about half an inch, would not have the same effect on the vinous fermentation as the Gervais apparatus? We say that it would have more: for, in the case of an increased weight of the atmosphere, the pressure all around the tun would be equal to that upon the surface of the liquid. One marked difference would be, that there would be no exit through the pores or chinks of the tun; for these fissures would be equally pressed upon by the external atmosphere. We have been long aware that the variations of the barometer are indicative of alterations in fermentative processes of every kind; and we doubt not that a time will arrive when that instrument will be considered as a necessary appendage to the other instruments which are now consulted by the manufacturers of vinous liquors. Persons who have not attended to this particular subject, (and there are few who have,) can have no conception of the effects of atmospherical variations. Wine-making is confined to a certain season, and to countries where the variation of the barometer is comparatively small; it is in the regions of the north that those effects are more particularly worthy of observation. On this subject we have made many experiments; but what might be useful as suggestions to a scientific manufacturer, would be here out of place. As long as the mind remains doubtful of the facts, they ought not to be given to the world as *knowledge.*

"The author last quoted has proposed a mode of close fermentation, which is free from the errors and absurdities that attach to that of Mademoiselle Gervais; and as it may be useful in the vinous fermentations of this country, and does not interfere with the English patent above mentioned, we take this opportunity of publishing a brief description of the process:

Fig. 2.



"A and B, in fig. 2, represent two of any number of fermenting tuns, which may be arranged and combined on the same principle. They are here re-printed as of the same size, and as placed on the same horizontal level; but these circumstances, though convenient, are not necessary. The lines *a a* and *b b* mark the surface of the *must*, or other fermentable liquid.

"D D is a pipe, communicating with each tun by means of branches, which are inserted through the close head, and which may be stopped at any time, by means of the stop-cocks *c c*.

"C is a cask or other vessel, filled with cold water, through which the pipe D D is

continued in the form of a worm, *o o o o o:* this water may be drawn off when too warm by means of the cock *d*, when this refrigerator can be re-filled with cold water, through an opening in the head.

"E is a smaller vessel or tub, destined to receive the product of the condensation of the vapors arising from any or all of the fermenting tuns. Those vapors rising in the branch pipes *c c*, into the main D D, pass through the worm *o o o o o*, which is bent, when it leaves the refrigerator, into the tub E, reaching half-way to its bottom.

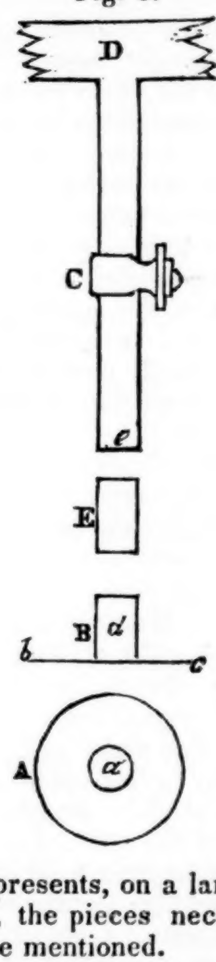
"It will be obvious, from this arrangement, that the condensable vapors which arise with the carbonic acid gas, will, by passing through the refrigerator, be collected at the bottom of the tub E in a fluid form, while the upper part of the tub will be filled with gas. Care must be taken to draw off portions of this fluid from time to time, (by means of a cock in the bottom of the tub, which is not here represented,) so that it may never rise above the level of the orifice of the worm; for were the fluid, for example, to rise to the level *e e*, it would, according to its gravity, form an hydraulic valve, which would cause an additional pressure upon the surface of the fermenting liquid, the prominent objection to the Gervais apparatus.

"On this plan, the complex apparatus for each tun is rendered unnecessary; for a single one of sufficient size will serve for any number of working tuns. The condensed liquid is not hereby returned to cool the fermenting mass; and the distiller, for whom we should suppose the practice well adapted, might carry the liquid from the tub E directly to the still. It may, however, be returned into the mass by a long-stalked funnel, if desired. The worm gives a free passage to the vapors; since its lower extremity, being plunged only in carbonic acid gas, cannot be said to offer any obstruction. The liquid in the tun is then fermented solely under the simple pressure of the atmosphere; and the carbonic acid gas, finding an easy escape through the opening of the worm, no longer seeks to force a passage through the pores of the wood or the chinks of the tun.

"The gas, which, on account of its density, constantly fills the tub E, prevents all risk of absorption of atmospheric air as completely as is done by the hydrostatic valve of Gervais. When there is a range of tuns, one or more will be continually discharging carbonic acid gas; but where there is only a single tun, and that not in full operation, the accession of air could be equally well prevented, for it would only be necessary to fill the tub with water until the surface should rise two or three-tenths of an inch above the lower extremity of the worm, as shown by the line *e e*.

"When we want at any time to look at the state of a tun, we have only to shut the cock *c* (which shuts out all communication with the others), and, opening a plug-hole in the head, draw off what we require by means of the cock at the bottom. In the same manner we may charge and discharge the several tuns successively, without their interfering with one another. Each may be washed out by having a *man-hole* in the upper end; or it may even be taken away and re-placed by another, without retarding the operations of its neighbors. For the more easy performance of this latter purpose, M. Dubrunfaut recommends the following disposition of certain parts in the construction of the apparatus:

Fig. 3.



"Fig. 3 represents, on a larger scale than that of fig. 2, the pieces necessary for the purpose above mentioned.

"B is a tube and flange, seen sideways, of which A is the face, being a circular plate of the diameter of its section *b c*. This piece is fixed by nailing the disc *b c* upon the head of the tun, in such a manner that the opening *a* corresponds with the hole which is made in the head of the tun, for the purpose of allowing the escape of the gas: the

tube *d*, of which *a* is an extremity, being of the same diameter as the hole.

"The tube *d*, which is thus perpendicular to the head of the tun, is of the same diameter as the tube *e* of the piece C; and these two tubes, when the apparatus is finished, will be united at their orifices so as to form a single continued pipe. In order to close completely any little openings between their orifices, the cylinder E, the diameter of which is a little larger than that of the tubes *d* and *e*, is drawn over the junction, and its extremities are luted to those tubes so as to prevent all access of air or escape of gas. The piece C is previously united to the larger tube D, which here represents a part of D D, fig. 2. From this disposition of the parts, it is easy to see, that by shutting the cock of the piece C, and pushing upwards the moveable socket E, the tun may be completely disengaged, without affecting any other part of the general arrangement.

"We have dwelt the longer on this subject because of its probable adoption by the distiller and vinegar maker, for whom we should suppose the close fermentation to be better adapted than to the brewer, or even to the foreign wine-maker. The produce will be found to be very various, according to the heat of the fermentation and the quality of the fermenting fluid. At an average, perhaps, it may be estimated at about the two-hundredth part of the quantity of liquid that is fermented; and in quality, chiefly water mixed with a small portion of alcohol, or rather of the immediate materials of alcohol."—pp. 16–23.

On the adulteration of foreign wines, we have the following acute remarks:

"To the inhabitants of this country it is of much less importance to know how any particular species of foreign wine is manufactured, than to learn how to guard themselves from the effects of its adulteration. The following observations may, perhaps, account for an occasional accident, and at the same time may serve as a caution to the bottlers of wine in this country.

"We have already mentioned, that the bottled wines of the Continent (particularly champagne) undergo at least one or two *decantings* or *rackings* in the bottles before they are exported. A *bin* of wine is tried, to see whether or not it is fit for the foreign market. The practice is (especially in the wine of which we speak) to use very fine, that is, elastic corks; to push them half into the bottle; and to press the upper part over the neck, in a sort of girth or rim, which is kept down by means of twisted wire. This cover of the top of the bottle is re-covered with wax of a certain color, and what that color is depends on the substances with which the wax is mixed. If it be yellow, the coloring matter is orpiment; if it be green, the color is usually given by a mixture of orpiment and Prussian blue. Both these coloring matters are poisonous; for orpiment is sulphuret of arsenic, and Prussian blue is formed from one of the most instantaneous poisons—the prussic, or, as it is now termed, hydrocyanic acid.

"Let us suppose, then, that a bin of champagne is intended to be exported, or, if in a British cellar, to be sent to a customer. A bottle is drawn for trial, and is found to be deficient in effervescence. This can be remedied by inducing a new fermentation; and we know that it is the practice to accelerate this desirable quality by means of the introduction of a syrup of sugar candy, mixed and purified with cream of tartar. This addition, which is put into the bottle in proportion to the taste of the customer, is certainly not deleterious. But the cork is drawn, the seal is broken, and a part, perhaps a few chips of the wax, is rubbed off, and enters into the bottle. If the color has been either green or yellow, arsenic also enters; and, unfortunately, the world is but too well acquainted with the consequences. We may also add, that in French cellars the wax has another object in view besides (what is generally thought) the exclusion of the atmospheric air. In that country there are numerous swarms of insects, who are ready to devour the corks, and penetrate to the liquid. As far as regards these insects, the poisonous quality of the coloring matter is not to be regretted."—p. 52.

A danger of a less formidable nature to be guarded against, is the substitution of certain home-made imitations for the genuine products of the continental vineyards:

"Of all the vinous liquids which are manufactured in this country, beer and ale, cider and perry, (and mead and mum, when not banished by excise regulations,) are the only kinds that can be called national. The juices of most of our native fruits possess too little *saccharum* to be fermented pure; and when malt wort, or honey, was formerly added, as sugar has been in late times, the compound was also flavored and colored with extraneous substances, so as to imitate one or other of the favorite wines of the Continent. This was more particularly attended to when the making of 'sweets,' or 'British wines,' became a trade. The imitation of foreign wines originated in fraud, and excise duties raised the imitators to the rank of authorised manufacturers. As long as these gentlemen

were contented with the ordinary names of currant wine, gooseberry wine, &c. all was well; but we now see champagne, sherry, port, &c. in the bills of the British wine makers, and we have little doubt that some of these compounds occasionally find their way into the cellars of the 'dealers in foreign wines.' Champagne, in particular, is a very high priced article; and the British champagne, made from gooseberries, if properly made, and drunk when young, may impose upon three-fourths of the purchasers. Perry, also, particularly in mixture, is passed off for champagne, and is, perhaps, not much inferior to the real wine which it imitates. It is not so much the inferiority as *the lie*, which passes a cheaply made article for one that is more expensive, that constitutes the quackery and the crime of those ingenious imitators. If we can make a British wine equal to champagne, we have a right to do so; but we have no right to pass it off *in trade* as a foreign wine."—pp. 61, 62.

In the "Appendix concerning Cider and Perry," Mr. Booth represents the English manufacture of both these liquids to be in a very declining state. His observations on the subject are well deserving of attention:

"We have reason to believe that the superior sorts of perry, as well as of cider, though they may have the same names, are not equal to what were sold for such forty or fifty years ago. Most of the trees that were famed for the excellence of their produce are either dying or dead. Mr. Marshall published his Rural Economy of Gloucestershire in 1789, at which period he laments the decay of the finest fruit trees. 'All the old fruits,' he says, 'which raised the fame of the liquors of this county (Herefordshire,) are now lost, or so far on the decline as to be deemed irrecoverable. The *red streak* is given up; the celebrated *stire apple* is going off; and the *squash pear*, which has probably furnished this country with more *champagne* than was ever imported into it, can no longer be got to flourish; the stocks canker and are unproductive.' The squash pear is described as remarkable for the tenderness of its flesh, which bursts, (or rather burst*ed*,) if allowed to fall ripe from the tree; and hence the name.' —pp. 119, 120.

The pity is the greater, that our British perry is (or rather was) a species of wine particularly worthy of cultivation:

"Perry, when the manufacture has been successful, is much more similar than cider to the sweet wines of the grape. Without any mixture it has often been taken for the best quality of effervescing champagne. The juice, mixed with an equal quantity of a purified syrup of sugar or of honey, of about 25 lbs. gravity, (being allowed to finish its fermentation, so as to be bright before bottling,) is scarcely to be distinguished from a foreign wine of a superior species."—p. 121.

On the Construction of Railroads.

To the Editor of the Railroad Journal:

Sir,—You know it is only a matter of course that I should read the article of "J." on the subject of a road of earth expressly for steam carriages, in your 32d number, with peculiar gratification. (See Mechanics' Magazine, vol. iv., p. 109.) It is by no means certain that the subject will attract the attention of those who are most interested, and able to turn the suggestions to a good practical account. I hope it may. However, I offer you a few further observations in relation to it of a plain character. Experience must show what kind of road is best for this purpose. I observe, that at this time, (the season is dry,) the heavy stage, with its small wheels of narrow tire, and when full of passengers and baggage, (near 3 tons,) in passing by my door, if the wheels happen to go a little out of the common track, which has been beaten into dust by the horses' shoes and the wheels, they make a track or indentation that is scarcely perceptible.

The materials of this road are not gravel, but a mixture of sand and clay, such as constitutes either the upper or the second stratum of earth generally through this region. It is perfectly apparent then, that, when dry, if it were accurately graduated, and not cut up by horses' feet and narrow tires, it would be little inferior to a rail. During the time a drizzling rain is falling, it certainly is softened one eighth or one fourth of an inch, but immediately after the rain it dries and recovers its solidity, and this result would be accelerated and perfected by the passing of such wheels as "J." has suggested. From the showing of this writer and various articles which have appeared in the Journal, it is manifest that the advantage which a railroad has over a road of earth is limited to a road level, or nearly so; and that when you arrive at an ascent of one in fifty, it is even better than a railroad. Can this be so? Few railroads can be constructed without occasional ascents as great as one in fifty. But, evidently, if a line of road have *one* such inclination, this, of course, limits the performance of the locomotive, for, practically, it is of no use to give it a greater load on the level portion than it can take over the ascent; and all the

advantage which a railroad has over a road of earth, practically, is lost. Nay, if it should have one ascent near to that which requires additional aid, it is greatly superior, and that superiority increases rapidly as the inclination is greater. I say again, can it be so? What is, then, the necessity of railroads?

But, furthermore, the construction of a railroad is a nice affair; every part must be kept perfectly tight and in its place; only small wheels can be used; and, although for trial and exhibition a locomotive may run even 40 or 50 miles an hour, yet, practically, they do not exceed 15 or 20. Whereas, it appears to me, that by the use of large wheels, (and why may they not be made even 15 feet diameter,) a locomotive may be driven on a road of earth, ordinarily, at any velocity which the resistance of the atmosphere will admit—say 50 to 60 miles an hour. It is certain, at least, that the progress of the large wheel is not only greater for each revolution, but its motion is much more smooth and equable, and not subject to jostling or agitation. I am not at present aware of any disadvantage attending large wheels, except their gravity causing a greater indentation of the road, and greater resistance in ascending an inclination. The first, I think, would be prevented by the increased diameter and breadth of tire, and the latter compensated by the greater adhesion; and finally, engines of almost any required power could be used.

Perhaps most of the above remarks are merely repetitions of what you have published before; but if there is not some very great fallacy or mistake in all that has appeared on this subject, they ought to be repeated until noticed and tested by experiment.

But, one word more: if roads of this description, by reason of frost, are not adapted to northern regions, they certainly are to Virginia, Kentucky, and all the southern part of our favored land, where little inconvenience is occasioned by frost. C. O.

WHAT O'CLOCK IS IT?—When I was a young lad, my father called me to him that he might teach me how to know what o'clock it was. He told me the use of the minute finger and the hour hand, and described to me the figures on the dial plate, until I was pretty perfect in my part.

No sooner was I quite master of this additional knowledge, than I set off scampering to join my companions at a game of marbles; but my father called me back again, "Stop, Humphrey," said he, "I have something more to tell you."

Back again I went, wondering what else I had got to learn, for I thought I knew all about the clock quite as well as my father did.

"Humphrey," said he, "I have taught you to know the time of the day, I must now teach you how to find out the time of your life."

All this was strange to me, so I waited rather impatiently to hear how my father would explain it, for I wanted sadly to go to my marbles.

"The Bible," said he, "describes the years of man to be three-score and ten, or four-score years. Now, life is very uncertain, and you may not live a day longer; but if we divide the four-score years of an old man's life into twelve parts, like the dial of a clock, it will allow almost seven years for every figure. When a boy is seven years old, then it is one o'clock of his life, and this is the case with you: when you arrive at the age of fourteen years, it will be two o'clock with you; and when at twenty-one years, it will be three o'clock. Should it please God thus to spare your life, looking at the clock may perhaps remind you of it. My great grandfather, according to his calculation, died at twelve o'clock; my grandfather at eleven; and my father at ten. At what hour you and I shall die, Humphrey, is only known to Him to whom all things are known."

Never since then have I heard the inquiry, "What o'clock is it?" nor do I think that I have even looked at the face of a clock, without being reminded of the words of my father.

I know not, friends, what o'clock it is with you, but I know very well what time it is with myself; and that if I mean to do any thing in this world, which hitherto I have neglected, it is high time to set about it. The words of my father have given a solemnity to the dial plate of a clock, which it never would, perhaps, have possessed in my estimation, if these words had not been spoken. Look about you, my friends, I earnestly entreat you, now, and then ask yourself what o'clock it is with you.

THE *Mechanics' Magazine and Register of Inventions and Improvements* is published by the Proprietors, D. K. MINOR and J. E. CHALLIS, at No. 35 Wall street, New-York: in *weekly* sheets of 16 pages, at 6¼ cents—in monthly parts of 64 pages, at 31¼ cents—in volumes of 384 pages, in cloth boards, at $1.75—or at $3 per annum *in advance*.—JOHN KNIGHT, (formerly proprietor of the London Mechanics' Magazine,) Editor.